REMARKS/ARGUMENTS

Favorable reconsideration of the present application is respectfully requested.

New Claim 9 further recites that the oxygen enriched air comprises a mixture of preheated air and pure oxygen. Basis for this is found in the last two lines of page 9 in the specification.

Applicants note with appreciation that the prior ground of rejection has been withdrawn in view of the arguments presented in the last response. Claims 1-8 have nonetheless been newly rejected under 35 U.S.C. §103 as being obvious over U.S. patent 5,989,019 (Nishimura et al) in view of U.S. patent 4,622,905 (McDougall et al). This rejection, however, is respectfully traversed.

Applicants initially wish to note that a rejection based on Nishimura et al had previously been applied in the Office Action dated November 22, 2006. This rejection was withdrawn by examiner McNelis on May 9, 2007, in view of the arguments presented in the response of February 22, 2007. It is respectfully submitted that those arguments remain valid and that the claims define over this prior art.

As previously explained, the present invention is based on the recognition that a higher oxygen content in the oxidant supplied to the primary burners of a reducing furnace would create a higher flame temperature and NO_x content (see specification, pages 11-12), whereas a lower oxygen concentration in the primary combustion air limits the flame temperature and NO_x produced by the primary burners. Claim 1 thus recites that the secondary combustion air is oxygen-enriched air, and the oxygen concentration in the primary combustion air is controlled to be lower than the oxygen concentration in the secondary combustion air.

Nishimura et al discloses a rotary hearth furnace including primary burners 4 and air feeders 6 which supply a secondary combustion air to a position where flammable gas is

generated during the reduction of the metal oxide in the furnace. Nishimura et al indicates that the primary burners 4 use air as an oxidizing agent (col. 3, line 14).

As was explained in the prior response, as a result of which the rejection based on Nishimura et al was withdrawn, Nishimura et al indicates that the elements 6 which feed gas for secondary combustion can also feed air. The elements 6 are universally referred to as "air feeders" which "feed air at a position where the flammable gas Ga is generated" (col. 4, lines 30-31). This indicates that air is fed to both the burners 4 and the elements 6, *so that neither has a higher oxygen concentration*.

Applicants note that the Office Action has relied specifically on the description at the top of column 3 of Nishimura et al that the gas for secondary combustion need not necessarily be air but can instead be "oxygen-rich gas." It appears to be the position of the Office Action that the mention of "oxygen-rich gas" as the alternative gas for secondary combustion is a teaching of the use of a gas whose oxygen concentration is greater than air, in which case that Nishimura et al presumably discloses that the oxygen concentration in the primary combustion air is lower than that in the secondary combustion gas. However, it is noted that this precise point was raised in the prior Office Action of November 22, 2006 (p. 4) and subsequently withdrawn.

As Applicants explained in the response that resulted in the withdrawal of the prior rejection based on Nishimura et al, lines 1-2 of column 3 in Nishimura et al simply describe two alternatives for the secondary combustion gas. One alternative is air and the other is an "oxygen-rich *gas*" (to be contrasted with "oxygen enriched air"). But this does not mean that the "oxygen-rich gas" is a gas whose oxygen concentration is greater than air. Air itself is an oxygen-rich gas since it has a significant oxygen content (e.g., it is "oxygen rich" as compared to nitrogen gas). Thus lines 1-2 of column 3 in Nishimura et al simply indicate that the secondary combustion gas, if not air, will also have a significant concentration of oxygen

so that it can be used to combust the generated gas; not that the oxygen concentration of the secondary gas is greater than that of air.

Indeed, Nishimura et al teaches against an excessive oxygen concentration for the secondary gas. Nishimura et al describes that the secondary combustion gas may re-oxidize the reduced product in case of a small amount of generated flammable gas (column 4, lines 59-61). A high oxygen concentration in the secondary combustion gas enhances this risk. Thus, to the extent that the "oxygen-rich gas" alternative of Nishimura et al has an oxygen concentration different from air, this concern suggests that the oxygen concentration of the secondary gas should be *less than* that of air (the primary combustion gas) – the opposite of what is claimed.

As to the description in Nishimura et al mentioned in the outstanding Office Action that "the ratio of the amount of gas for primary combustion fed to the burner to the amount of gas for secondary combustion is regulated for the purpose of controlling temperature" (col. 2, lines 38-44), it is noted that this description refers only to the ratio of the *quantities* of primary and secondary gases, *not their oxygen concentrations.*

Thus, Nishimura et al fails to teach a step of supplying secondary combustion air to the reducing furnace "wherein at least the secondary combustion air is oxygen-enriched air, and the oxygen concentration in the primary combustion air is controlled to be lower than the oxygen concentration in the secondary combustion air."

McDougall et al discloses a reducing furnace which can use powdered coal as a fuel source. It describes that the coal fuel must be of a grade having a certain minimum heat value in order to produce a sufficient flame temperature when using air as an oxidant (col. 3, lines 2-6). The Office Action has relied specifically on the further description at lines 11-12 of col. 3 that "if oxygen or oxygen enriched air is employed as the combusting gas even poorer grades of coal can be used as the sole fuel."

According to the Office Action, it would have been obvious in view of this teaching that the secondary gas in Nishimura et al should have a higher oxygen concentration than the primary gas, because McDougall et al presumably teaches that "the oxygen concentration in the primary gas can be less than that of a secondary gas." However, it is respectfully submitted that McDougall et al provides no such teaching.

As already explained, Nishimura et al has no teaching that the secondary combustion air is oxygen-enriched air, or that the oxygen concentration in the primary combustion air is controlled to be lower than the oxygen concentration in the secondary combustion air. Moreover, McDougall et al does not disclose a furnace that supplies both a primary and secondary combustion gas, and so could not provide a teaching for the ratio of the oxygen concentrations of such gases.

In any case, the teaching of McDougall et al is simply that the oxidant supplied to the burner must have a sufficient oxygen concentration, in view of the grade of the coal dust fuel, to maintain a minimum flame temperature. This is not a teaching that "the oxygen concentration in the primary gas can be less than that of a secondary gas" – it relates only to the oxygen content of the primary gas. Moreover, it suggests that the oxygen content of the primary gas should be *high*, to maintain a minimum flame temperature. This is the *opposite* of what is claimed. It is therefore respectfully submitted that the claims define over this prior art.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early Notice of Allowability.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon

Robert T. Pous
Registration No. 29,099
Attorney of Record

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 03/06)